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Dear Sir:

<u>Discussions are underway between Bendix Aviation Corp., Detroit, and the USAEC</u>, on a Bendix proposal to undertake a privately-financed feasibility study of a nuclear reactor to produce radioisotopes on a commercial basis. This is in line with the USAEC's previously announced policy of encouraging wider industrial participation in the reactor development phases of the national atomic energy program. (Now, the USAEC has before it proposals from industrial groups or firms for studying the practicality of designing and building materials-power producing reactors, and for developing industrial uses of radioactive fission products. Page 2, this LETTER)

<u>A record peacetime budget of $1,210,000,000.00, for fiscal 1952</u>, has now been requested of Congress by the USAEC. This will bring the U.S.'s investment in atomic energy to approximately $7.5 billions. (Page 3, this LETTER; budget analysis.)

<u>To spur prospecting for, and development of strategic minerals in the U.S.</u>, Dr. James M. Boyd, head, U.S. Bureau of Mines (and director of Defense Minerals Administration), stated in Salt Lake City last fortnight that Federal aid will be given to searches for uranium (among other minerals). The aid will be in the form of Federal funds, which will be provided at a 90-to-10 ratio (with the Government putting up the larger share) in interest-free loans. The loans will be for a ten year period.

<u>A recent public offering of 47,700 shares of common stock of the Atomic Instrument Co., of Cambridge, Mass.</u>, was quickly over-subscribed, the Philadelphia underwriters (Coffin, Betz & Co.) have now stated. The stock was offered at $3.87½ a share. Industry observers cite this as an instance of the increasing measure of confidence of the investing public in the nuclear instrument field.

<u>Following upon the recent purchase by Tracerlab, Inc., Boston</u>, of a majority interest in the Kelley-Koett Manufacturing Co., Cincinnati, O., and Covington, Ky., Mr. Robert G. Millar has been elected to the presidency of Kelley-Koett. Mr. Millar has previously been vice-president and general manager of Tracerlab. (The two companies together now employ well over 1,000 people, and their total sales volume for the coming year will probably exceed $15,000,000.00, Mr. William E. Barbour, Jr., Tracerlab president recently stated.)

<u>General Electric Co</u>. has asked for bids for construction of a radiochemistry building at the Hanford Plutonium Works Richland, Wash. which G-E operates for the UASEC. The lump-sum bids will be opened on May 3rd. Plans and specifications ($50 deposit) are obtainable from the USAEC, or construction council offices throughout the Northwest.

Subscription rates: United States, U.S. possessions, and Canada, $18.00 a year. Latin America, $20.00 a year. All other countries, $25.00 a year.

NEW HORIZONS FOR INDUSTRY IN THE ISOTOPES FIELD. A special digest, prepared for readers of this NEWSLETTER, of remarks by USAEC Commissioner T. Keith Glennan, before the "Radioisotopes in Industry" Conference held at Case Institute of Technology, Cleveland, April 2-6, 1951.

Isotopes for scientific, medical, agricultural, and industrial use constitute by far the most important contribution of the development of atomic energy to peacetime welfare. However, we have hardly begun to scratch the surface so far as realizing the ultimate potentialities of isotopes is concerned.

The availability of isotopes in quantity, brought about by the establishment of the U.S. atomic energy program, while strictly a "by-product", has in turn had some definite effects upon isotope development. It has, for example, resulted not only in their increased utilization, but also in the growth of brand new subsidiary industries, such as the radiation detection industry, which now does about 8 million dollars worth of business a year, and of an as yet relatively small industry which synthesizes isotopic compounds and provides supplies and services to isotope users.

Why is the Federal government in the isotope business? It is not there because isotopes are secret or need to be controlled for security reasons, but rather because it is virtually the only source of supply. This is because the vast majority of isotopes are produced in nuclear reactors which contain fissionable materials that can also be used in weapons.

While it is the ultimate objective of the USAEC to get out of the isotopes business, here is the situation as it is today: (1) Isotopes are available in great quantities; (2) Government monopoly is in the production and sale of isotopes; (3) The government subsidizes isotope production to a large extent by charging only enough to cover the cost of production and handling ;(4) The government provides special services to isotope users at cost or less in order to stimulate isotope utilization.

Now, however, there is much evidence that the isotope program is changing from a dominantly government enterprise, to a dominantly private enterprise. Here is some of the evidence. (1) If you are in the market for isotopes synthesized into compounds that are not available from the USAEC, you may be able to get them from any one of five different private companies. (2) Six months ago the USAEC agreed to lend sufficient fissionable material to the North Carolina State College so that institution could build at its own expense a low-powered nuclear reactor. While this reactor (the first non-USAEC in the United States) will be mainly for research and instruction in nuclear technology, it will also be able to produce certain radioisotopes. (3) Recently, the USAEC started discussions with Bendix Aviation Corp. (page 1, this LETTER) on a proposal by that firm to undertake a privately-financed feasibility study of a nuclear reactor to produce radioisotopes on a commercial basis. (4) The USAEC now has before it several proposals by industrial concerns for permission to obtain radioactive fission products from the government for the purpose of performing research into their possible use by industry if made available in quantity.

What are some of the things industry should do to encourage this trend away from government, of the isotope enterprise? They are: (1) More people should be trained in techniques of handling and using isotopes. Of course, colleges and universities bear much of the responsibility for this, but industry, with in-service training programs, scholarships, and the like, could add substantially to the supply of skilled isotope technicians. (2) Isotopes must be handled as other toxic and hazardous materials, and industry must be aware of its responsibility about the health and welfare of the general public. (3) Industry should make an intensive study of all the possible uses for isotopes--in process control, production, testing, and research. It is my personal belief that the maximum potentialities of isotopes have not yet even begun to be realized. (4) Carefully consider the economic factors. Will private production of isotopes be feasible without government subsidy? It is an involved problem, and many factors must be taken into account.

The U. S.'s Atomic Energy Program as it will be for the period June 30, 1951--July 1, 1952 (the 1952 fiscal year). (With some interesting sidelights.)

The USAEC budgetary need for the fiscal year 1952 has now been placed at $1,210,000,000.00 by the Commission. The largest annual budget to date, it contains a smaller percentage for plant and equipment, and a larger percentage for operations. This is because of the $1,431,000,000.00 for plant and equipment already granted the USAEC in fiscal year 1951, mainly for the tritium reactor project at Savannah River, and the new gaseous diffusion plant at Paducah, Ky.

SOURCE & FISSIONABLE MATERIALS PROGRAM- Since the quantity of fissionable materials produced determines the number of weapons that can be fabricated, and weapon output is on a rising curve, the output of fissionable materials is increasing. For this increase, as well as to offset higher raw materials costs, and for the new plant and equipment needed, operating expenses will increase $61.3 millions, while plant and equipment cost will increase $338.5 million, to a total cost of $847 million.

WEAPONS PROGRAM- This work is designed to support and advance theoretical and experimental nuclear weapon science; to provide for development and production engineering, and to operate a complex of atomic weapon manufacturing, assembly, and storage facilities. To continue extensive work on all aspects of this program, including the development of new and improved atomic weapons, and the industrial-type production of weapons of the latest approved designs, as well as to provide new plant and equipment, an increase of $90.7 million will make a total of $296.7 million that will be expended for these purposes.

REACTOR DEVELOPMENT PROGRAM- In the current program, four reactors are planned for full-scale development; construction and/or development is underway at the Reactor Testing Station, Arco, Idaho, with several others under preliminary development elsewhere. In addition, a production-type reactor is being developed in conjunction with the production program, on a full-scale, early-construction basis. Of the four at Arco, the "breeder" is designed around the possibility of utilizing fast neutrons for breeding purposes. The second, the materials testing reactor, is a tool for the study of materials for reactors. It is also of great interest to the Air Force, in view of the need for the most efficient and most compact reactor possible for ultimate aircraft propulsion. The third and fourth reactors are straightforward attacks on the problems of a reactor for ship and submarine propulsion.

Development has been practically completed on the experimental breeder and the materials testing reactors, with operating costs in the fiscal 1952 budget. Low power experiments will also be assembled for a reactor of the homogeneous type, and of the aircraft-propulsion type. Research will also continue on materials and systems of chemical processing, and heat transfer, essential to reactor design and operation. This expanded effort on new reactors during fiscal 1952 will include the initiation of construction on a ship propulsion reactor in that year. The total budget for this particular program will total $128.4 millions.

PHYSICAL RESEARCH PROGRAM- This covers the USAEC's fundamental research and fellowship program in physics, chemistry, metallurgy and mathematics. It will be increased in fiscal 1952 by $4,150,000.00, with a total of $37,766,000.00 to be expended. In fiscal 1952, basic physical research in the USAEC national laboratories will increase dollarwise by about $500,000.00, the third such increase made, with the largest in applied physics in the Berkeley area. (Atomic energy project at UCLA, etc.) Principal shifts in the physical research program as between 1951 and 1952, will be to press forward as rapidly as possible those developments of relatively immediate military interest. This does not mean that the entire range of the exploratory research program will not be carried forward at a vigorous level, but it is not being expanded by any significant amount. In the next year the expansion will be in the realm of areas where real promise of developments of military interest appears.

IONIZING RADIATION ... investigations & notes ...

The beneficial effects of vitamin B-12 and folic acid, on recovery from internal radiation by phosphorous-32, have been the subject of an investigation at the Dept. of Biochemistry and Internal Mecicine, Bowman Gray School of Medicine, Winston-Salem, N. C. W. E. Cornatzer, C. Artom, G. T. Harrell, Jr., and D. Cayer conducted the research. Four series of experiments were carried out, on a total of 525 mice. It was found that the addition of generous amounts of folic acid, or folic acid and vitamin B-12, added to experimental diets, had no significant effect on the survival of mice injected with a dose of phosphorous-32 in the higher range of the LD-50 (21st day). On the other hand, when sulfasuxidine was added to the diet, and the mice were injected with a dose of phosphorous-32 slightly below the LD-50 (21st day), the administration of vitamin B-21 and folic acid increased significantly the time of 50% deaths, the average time of survival, and the % of survivors (at both the 21st and the 56th day).

Further work on the protection against radiation injury afforded by glutathione has been done by E. P. Cronkite, W. H. Chapman, and G. Brecher, of the Naval Medical Research Institute and the National Institute of Health, Bethesda, Md. (Previous work by this group, and others, on the effect of reduced glutathione on radiation injury had shown that it will protect significantly when administered before irradiation, and that there is histologic evidence of more rapid regeneration of hematopoietic organs in the glutathione treated mice that were studied.) In the current work, in order to determine whether glutathione protection of the irradiated animal arose from selective concentration of reduced glutathione in radiosensitive tissues essential to survival, studies were made on the clearance rate and distribution of injected reduced glutathione. It was found that the clearance of intravenously injected glutathione (reduced) from the blood of dogs is rapid: less than 30-minutes. The disappearance of subcutaneously injected glutathione from the body of the mouse is much slower; more than 3-hours. Further, the distribution of injected reduced glutathione is not uniform throughout the body. Of the organs studied, it concentrates to a considerable extent in the liver, spleen, and kidneys. The experimenters observe concentration of glutathione at sites vital to survival may be the prime factor in glutathione protection of the irradiated mammal. Whether the protection arises from preventing radiation death of essential cells, or whether the protection is mediated through protection of humoral factors essential to orderly hemopoiesis, remains unanswered, the researchers feel.

In order to find which enzymatic reactions are affected by ionizing radiation in the intact animal, studies were made on the biochemical changes in tissues taken from irradiated animals, by K. P. Du Bois, K. W. Cochrane, and J. Doull, at the University of Chicago Toxicity Laboratory, University of Chicago. They measured the effects of toxic agents on citrate accumulation in vivo in these studies. It was found that lethal doses of X-rays (800 r) markedly inhibited citrate accumulation in spleen, thymus, ileum, pancreas, and testes of fluoroacetate treated rats, but exerted no significant effect on brain and heart. Sublethal doses of X-ray markedly inhibited citrate accumulation in spleen and thymus. The extent of inhibition was dependent upon the dose of X-ray and was reversible after sublethal doses and irreversible when lethal doses were given. Accumulation of citrate occurred in the livers of irradiated rats following fluoroacetate treatment, in contrast to the inability of livers of normal male rate to accumulate citrate following fluoroacetate treatment.

The use of chemical dyes in overcoming radiation effects is under study at the University of California, Los Angeles. Since it is known that radiation increases the amount of heparin in the blood, making coagulation difficult, and it is known that certain dyes act as antiheparin agents, one approach is along the lines of dye investigations. Preliminary research on rabbits has shown that toluidine blue and neutral red are effective heparin inactivating drugs. The research on this work is under the direction of Thomas J. Haley, chief of the division of pharmacology and toxology at the Atomic Energy Project, at UCLA, where the work is being done.

NEW PRODUCTS, PROCESSES, & INSTRUMENTS... for nuclear work...

FROM THE MANUFACTURERS- High Efficiency Gamma Tube, Model TGC-7. While designed for medical work where the rapid and accurate counting of gamma radiation, particularly from Iodine-131 is essential, this tube is also recommended by the manufacturer for other applications where fast and reliable measurement of gamma activity is desired. Gamma efficiency of the tube is said to be approximately ten times as great as that of standard mica window tubes, while its beta efficiency is said to be virtually zero. High efficiency of this tube is said to be the result of a special construction using multiple baffles inside the heavy metal sleeve of the tube. --Tracerlab, Inc., Boston 10, Mass.

Long Probe Gamma Survey Meter. This meter measures 0.3 r/hr to 3000 r/hr. Recommended for locating beams in particle accelerators, etc.....Enriched boron counter, said to have five times the efficiency of normal boron counters. Recommended for measuring neutron flux, to count neutrons from particle accelerators, etc. --General Electric Co., Apparatus Dep't., Schenectady, N.Y.

Count Rate Meters: Model 410 is said to be accurate to 2%. In addition to the standard Geiger probe input, the instrument is suitable for use with an alpha scintillation probe. Incorporation of a true Schmitt discriminator permits sine wave, square wave, and pulse counting without affecting calibration....Model 409, the second of these two new count rate meters, is said to have an accuracy of 5%, and to be suited for applications which are less exacting (than those which require the 2% of the Model 410), such as general safety work, monitoring, or search purposes. This instrument is based on a design which was originated in one of the country's research laboratories, Its small size (3-3/4" x 4-3/4" x 6-3/4") should make it useful where bench space is at a premium. The comparatively high accuracy, and stability for general monitoring, permits flexibility of use of the instrument. --Atomic Instrument Co., Cambridge 39, Mass.

Model RRCx-1 is an experimental model of a new low-cost disaster-type ratemeter. It is now available to interested manufacturers. --Radiation Research Corp., West Palm Beach, Fla.

ATOMIC PATENT DIGEST...latest U.S. applications & grants...

Method and apparatus for measuring radioactivity. An apparatus for indicating a change in voltage. Comprises an oscillatory circuit, including a plurality of electrical impedances, and means connected to the oscillatory circuit for injecting thereinto a voltage that is out-of-phase with respect to the voltage developed across the impedances so as to change the apparent value of one of the impedances by a variable amount. U.S. Pat. No. 2,547,017, issued April 3, 1951; assigned to Schlumberger Well Surveying Corp., Houston, Texas.

Multiple element radioactive ray recording. In a method of investigating radioactivity in a borehole drilled into the earth, the steps of (1) simultaneously lowering into the borehole several radioactive responsive devices having different radiation response characteristics, (2) exposing these devices to radioactivity in the borehole so as to cause at least one of them to respond, and (3) obtaining information about radioactive conditions in the borehole by comparing the indications and the responses of these devices. U.S. Pat. No. 2, 547,218, issued April 3, 1951; assigned to Schlumberger Well Surveying Corp., Houston, Tex.

A method of continuously removing oxygen, water vapor, hydrohalides, and halogens from a gas containing hydrogen, which comprises passing the gas over a hydride of a third period light metal of the class consisting of calcium and titanium heated to a temperature of at least 250 degrees C. U.S. Pat. No. 2,547,874, issued April 3, 1951; assigned to the United States of America (USAEC).

Pressure measuring apparatus. A method of measuring a low pressure of the order of 0.01 to 1.0 microns, occurring within a vacuum system. U.S. application No. 785,216, filed Nov. 12, 1947; published March 13, 1951.

Sincerely,

The Staff,
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